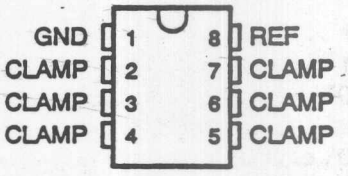
SLAS078 – D4102, SEPTEMBER 1993

- **Protects Against Latch-Up**
- **25-mA Current Sink in Active State**
- **Less Than 1-mW Dissipation in Standby Condition**
- **Ideal for Applications in Environments Where Large Transient Spikes Occur**
- **Stable Operation for All Values of Capacitive Load**
- **No Output Overshoot**

D OR P PACKAGE
(TOP VIEW)



description

The TL7726C, TL7726I, and TL7726Q each consist of six identical clamping circuits that monitor an input voltage with respect to a reference value, REF. For an input voltage (V_I) in the range of GND to < REF, the clamping circuits present a very high impedance to ground, drawing current of less than 10 μA. The clamping circuits are active for V_I < GND or V_I > REF when they have a very low impedance and can sink up to 25 mA.

These characteristics make the TL7726C, TL7726I, and TL7726Q ideal as protection devices for CMOS semiconductor devices in environments where there are large positive or negative transients to protect analog-to-digital converters in automotive or industrial systems. The use of clamping circuits provides a safeguard against potential latch-up.

The TL7726C is characterized for operation over the temperature range of 0°C to 70°C. The TL7726I is characterized for operation over the temperature range of –25°C to 85°C. The TL7726Q is characterized for operation over the temperature range of –40°C to 125°C.

AVAILABLE OPTIONS

OPERATING TEMPERATURE RANGE	DEVICE	PACKAGE
0°C – 70°C	TL7726CD	8-pin SO
0°C – 70°C	TL7726CP	8-pin DIP
–25°C – 85°C	TL7726ID	8-pin SO
–25°C – 85°C	TL7726IP	8-pin DIP
–40°C – 125°C	TL7726QD	8-pin SO
–40°C – 125°C	TL7726QP	8-pin DIP

solute maximum ratings over operating free-air temperature (unless otherwise noted)

Reference voltage, V_{ref} ..... 6 V
Clamping current, I_{IK} ..... ±50 mA
Junction temperature, T_J ..... 150°C
Continuous total dissipation ..... See Dissipation Rating Table
Operating free-air temperature range, T_A: TL7726C ..... 0°C to 70°C
TL7726I ..... –40°C to 85°C
TL7726Q ..... –40°C to 125°C
Storage temperature range ..... –65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds ..... 260°C

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A \le 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 85°C$ POWER RATING	$T_A = 125°C$ POWER RATING
D	728 mW	5.8 mW/°C	460 mW	374 mW	144 mW
P	924 mW	9.5 mW/°C	757 mW	615 mW	237 mW

recommended operating conditions

		MIN	MAX	UNIT
Reference voltage, V_{ref}		4.5	5.5	V
Input clamping current, I_{IK}	$V_I \ge V_{ref}$		25	mA
	$V_I \le GND$	–25		

ectrical characteristics over recommended operating free-air temperature range (unless herwise noted)

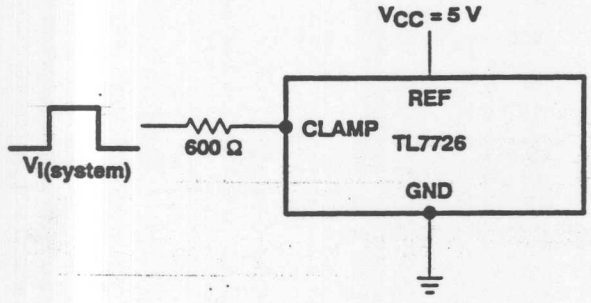
PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
V_{IK+}	Positive clamp voltage	$I_I = 20$ mA	V_{ref}		$V_{ref}+200$	mV
V_{IK-}	Negative clamp voltage	$I_I = 20$ mA	–200		0	mV
I_Z	Reference current	$V_{ref} = 5$ V		25	60	µA
I_I	Input current	$V_{ref} - 50$ mV $\le V_I \le V_{ref}$			10	µA
		GND $\le V_I \le 50$ mV	–10			µA
		50 mV $\le V_I \le V_{ref} - 50$ mV	–1		1	µA

† All typical values are at $T_A = 25°C$.

switching characteristics specified at $T_A = 25°C$

PARAMETER		TEST CONDITIONS	MIN	MAX	UNIT
t_s	Settling time	$V_{I(system)} = \pm 13$ V, $R_l = 600\ \Omega$, $t_t < 1$ µs, Measured at 10% to 90%, See Figure 1		30	µs

PARAMETER MEASUREMENT INFORMATION



TEST CIRCUIT

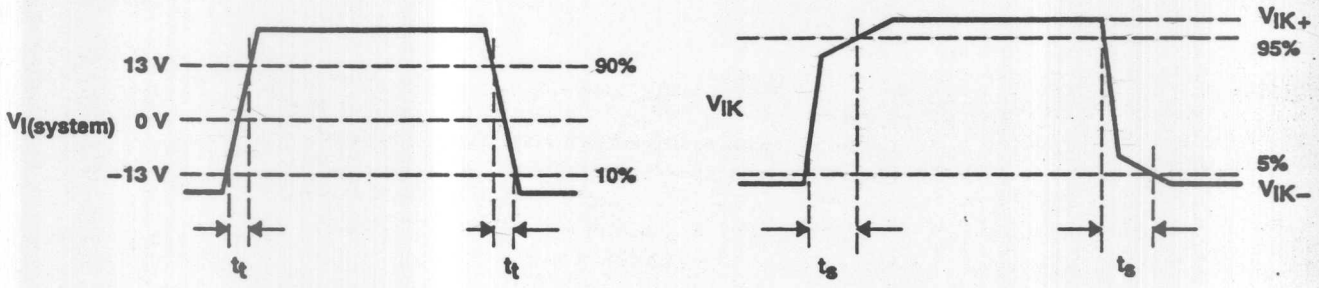


Figure 1. Switching Characteristics

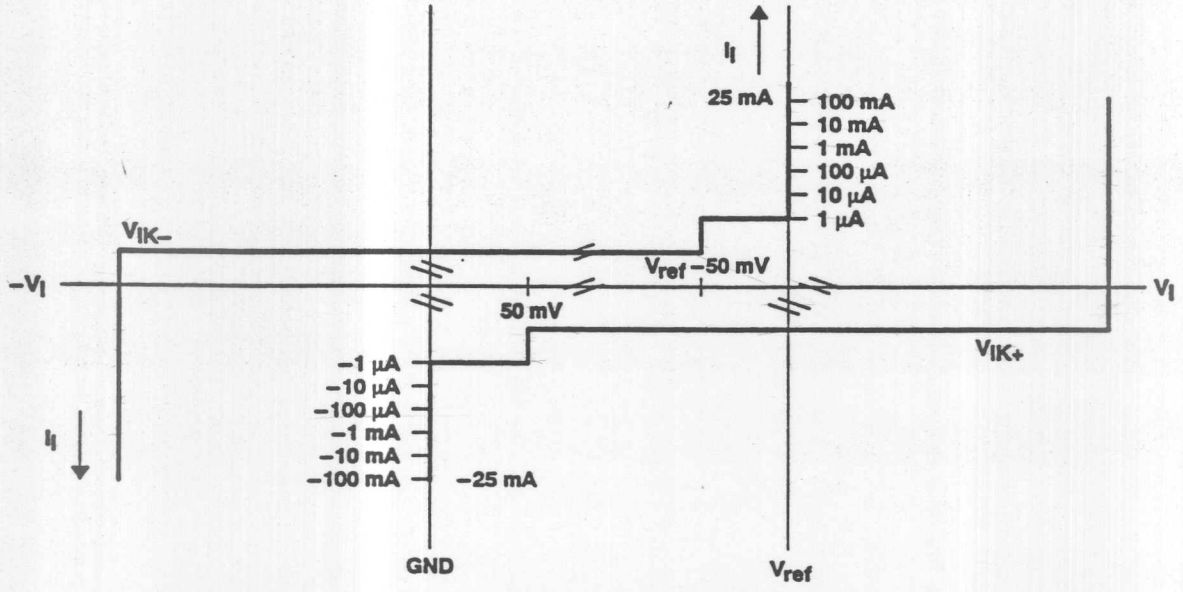
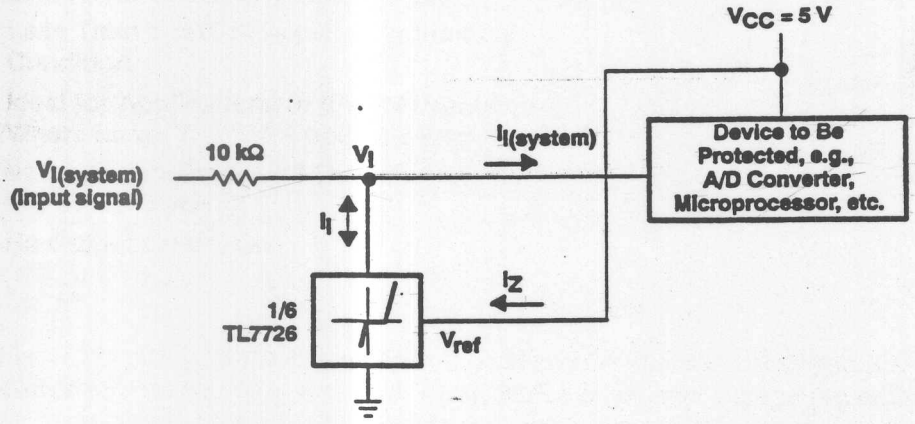


Figure 2. Tolerance Band for Clamping Circuit

APPLICATION INFORMATION



Example: If $I_I >> I_{I(system)}$, i.e., $V_{I(system)} > V_{ref}$ + 200 mV
where:

$I_{I(system)}$ = input current to the device being protected
$V_{I(system)}$ = input voltage to the device being protected

then the maximum input voltage

$$V_{I(system)}max = V_{ref} + I_I max(10k\Omega)$$
$$= 5\ V + 25\ mA(10k\Omega)$$
$$= 5\ V + 250\ V$$
$$= 255\ V$$

Figure 3. Typical Application